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User-oriented design of I/O-interfaces for assistance systems by example of vibration output

Initiation and motivation

A frequently appearing problem at assistance systems are non-adequate and badly to tasks and environments adapted utilisation interfaces for the respective users. Researches for instance had shown that so-called “standard components” like mini-computers (PDAs) are a few or not usable for mobile applications (without further adaption to tasks and users) [1].
Otherwise already could be shown that it is possible to adapt these not well-appropriate utilisation input interfaces even for users with especially strong requirements (like blinds and visual impaired) and nearby a high level of acceptation is reachable [2]. The same result should be reached now for output interfaces by applying a comparing methodology to expand the existing system about necessary output components.

Description of the output interface

Exemplary for any assistance systems an additional vibration output interface was developed under the special focus of use by several handicapped users within a touristic assistance system (TAS [2]). The opportunities of his interface additional to audio-visual outputs also realising the “two-sense”-principle. The use of this added (haptic) sensual channel allows using the hardware of the assistance system also for sensual shortened user groups like blinds or high-grade hearing and visual impaired. And by the use of more other interfaces the application spectrum can be broaden. (see [2], [3]).
The vibration output interface shown in fig. 1 will be coupled wireless to the existing system via Bluetooth™-standard which is already used for other components. Hints and information which are been presented audio-visually, are transmitted at the same

time to interface control unit. There it will be encoded by a microcontroller. With this some special and by an internal priority list as “very important” categorised information like “Stop” or “Danger” will additional indicate by vibration patterns. For these outputs different patterns were tested and the patterns with the highest recognition rate for the respective information were chosen (all pre-selected patterns had ≥70%).

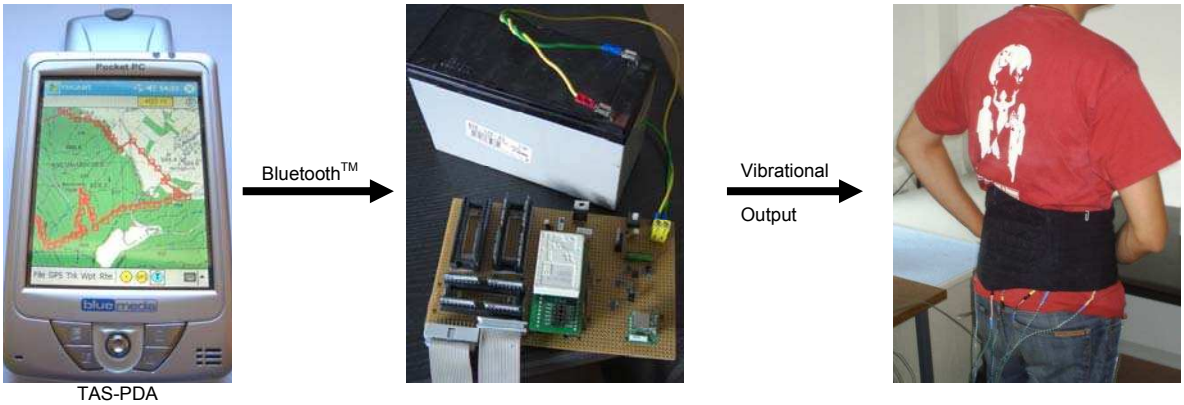

Figure 1: Block diagram of the laboratory sample (consists of a PDA, control unit and vibration belt)

Appreciation and outlook

Evaluation of the described haptic output interface had shown that it is possible to make assistance systems useful and usable also for highly heterogeneous user groups even by use of standard components if a systematic user-centred design process will be applied. The closing evaluation step with the addressed user groups in natural surroundings still has to be executed, and also some modifications to link the interface with the respective used assistance system will be implemented.

References:

[1] Larni J.: Working with a PDA while walking. In: Proceedings of the WWCS2004 Working with Computing Systems, Kuala Lumpur 2004.

[2] Roß F. & Lutherdt S: Abschlussbericht „TAS - Touristisches AssistenzSystem für barrierefreien Zugang zu Urlaubs-, Freizeit- und Bildungsaktivitäten“, Förderkennzeichen 03I2808. Technische Universität Ilmenau 2006.

[3] Lutherdt S. & Witte H.: TAS - Touristisches Assistenzsystem für Urlaub, Freizeit- und Bildungsaktivitäten – Ein Inno-Regio-Projekt der TU Ilmenau –. In: Leidner R. et. al.: Von Barrierefreiheit zum Design für Alle – Erfahrungen aus Forschung und Praxis. Arbeitsgemeinschaft Angewandte Geografie Münster e.V., Arbeitsberichte Heft 38 2007.

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